REPORT
ON THE
REBER PLAN
AND
BAY LAND CROSSING

by

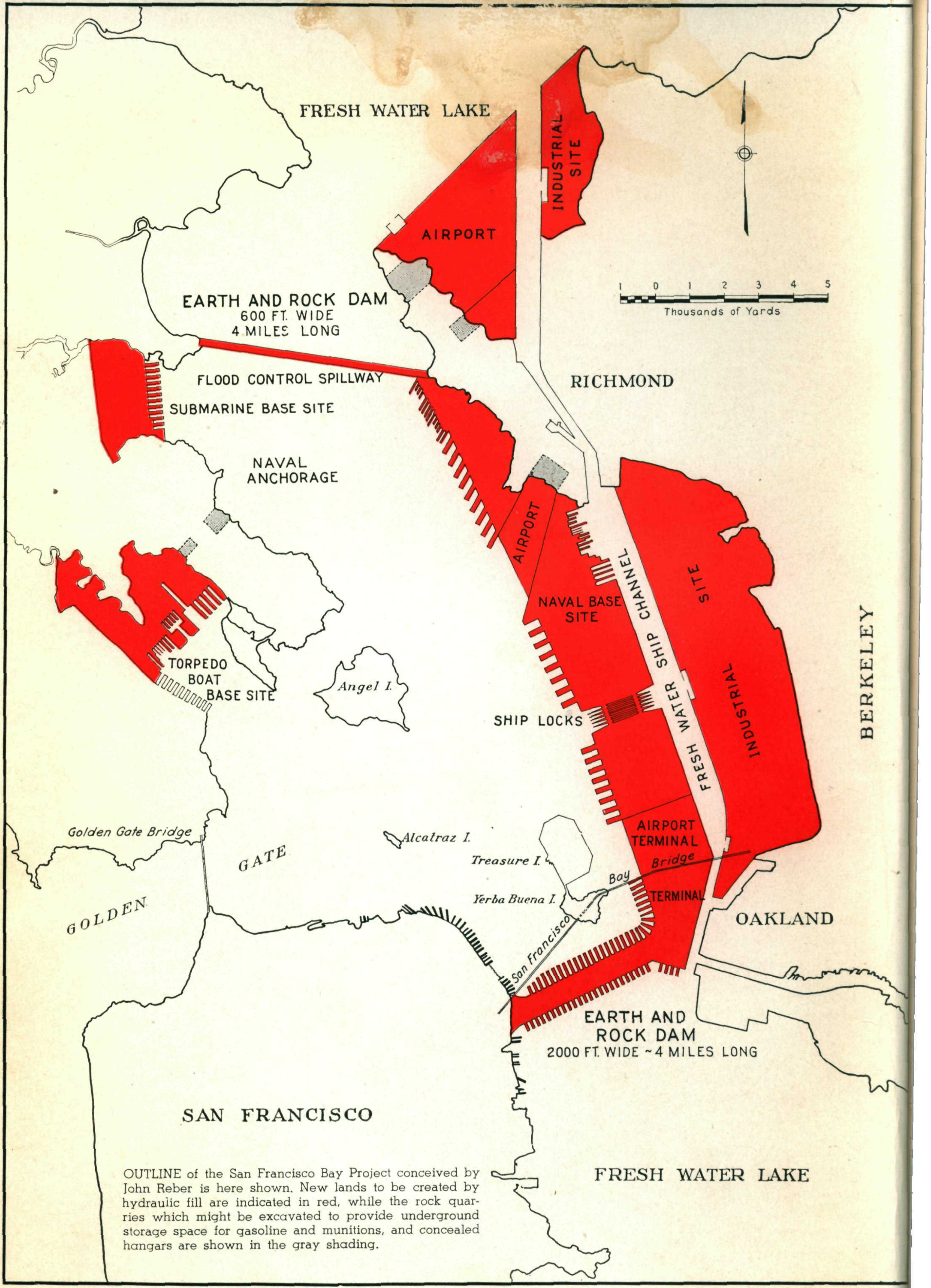
L. H. NISHKIAN
CONSULTING ENGINEER

TO

JOINT ARMY-NAVY BOARD

SAN FRANCISCO, AUGUST 12-15, 1946

SAN FRANCISCO BAY PROJECT — THE REBER PLA



OUTLINE of the San Francisco Bay Project conceived by John Reber is here shown. New lands to be created by hydraulic fill are indicated in red, while the rock quarries which might be excavated to provide underground storage space for gasoline and munitions, and concealed hangars are shown in the gray shading.

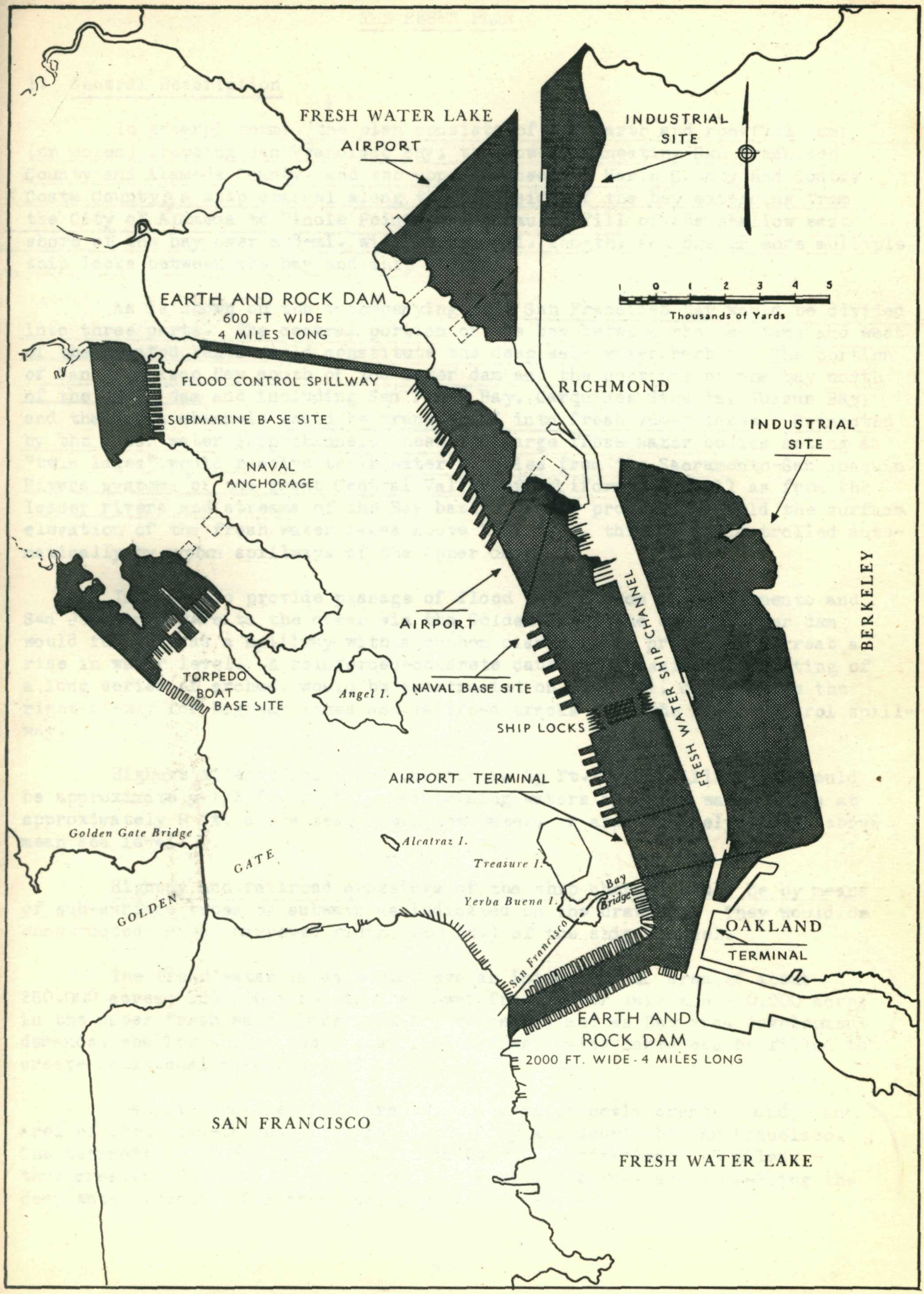
Impregnable all-land crossings of San Francisco Bay. Upper, 600 ft. wide; lower, 2000 ft. wide.

Trains of all railroads: Northwestern Pacific, Santa Fe, Western Pacific and all branches Southern Pacific enter San Francisco on solid ground.

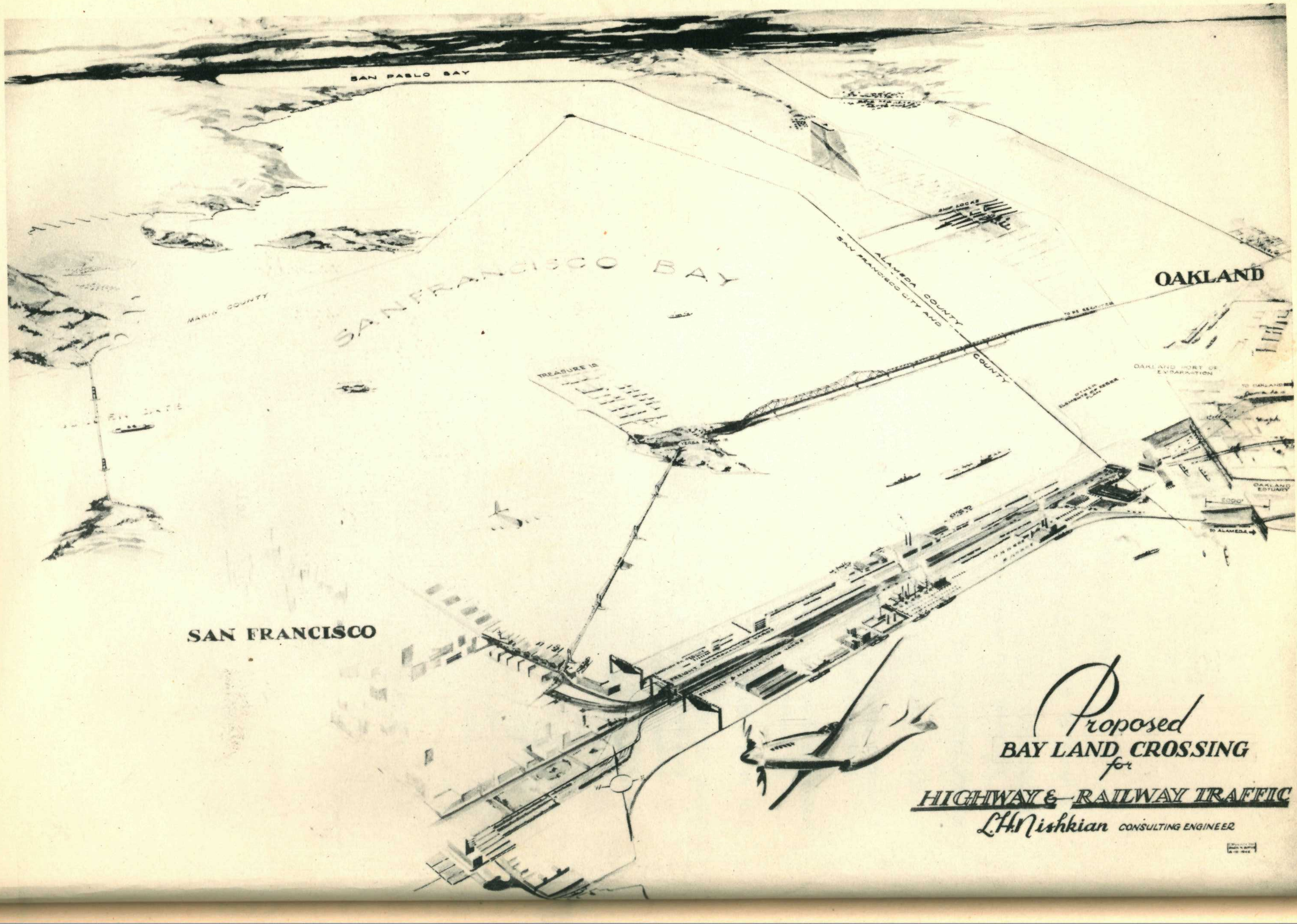
Super Freeways carry 24 to 48 lanes for motor cars, solving traffic problem forever.

20,000 acres newly-created lands for industry and National Defense. 280,000 acres fresh water lakes created, with fresh water for industry, agriculture, and domestic purposes.

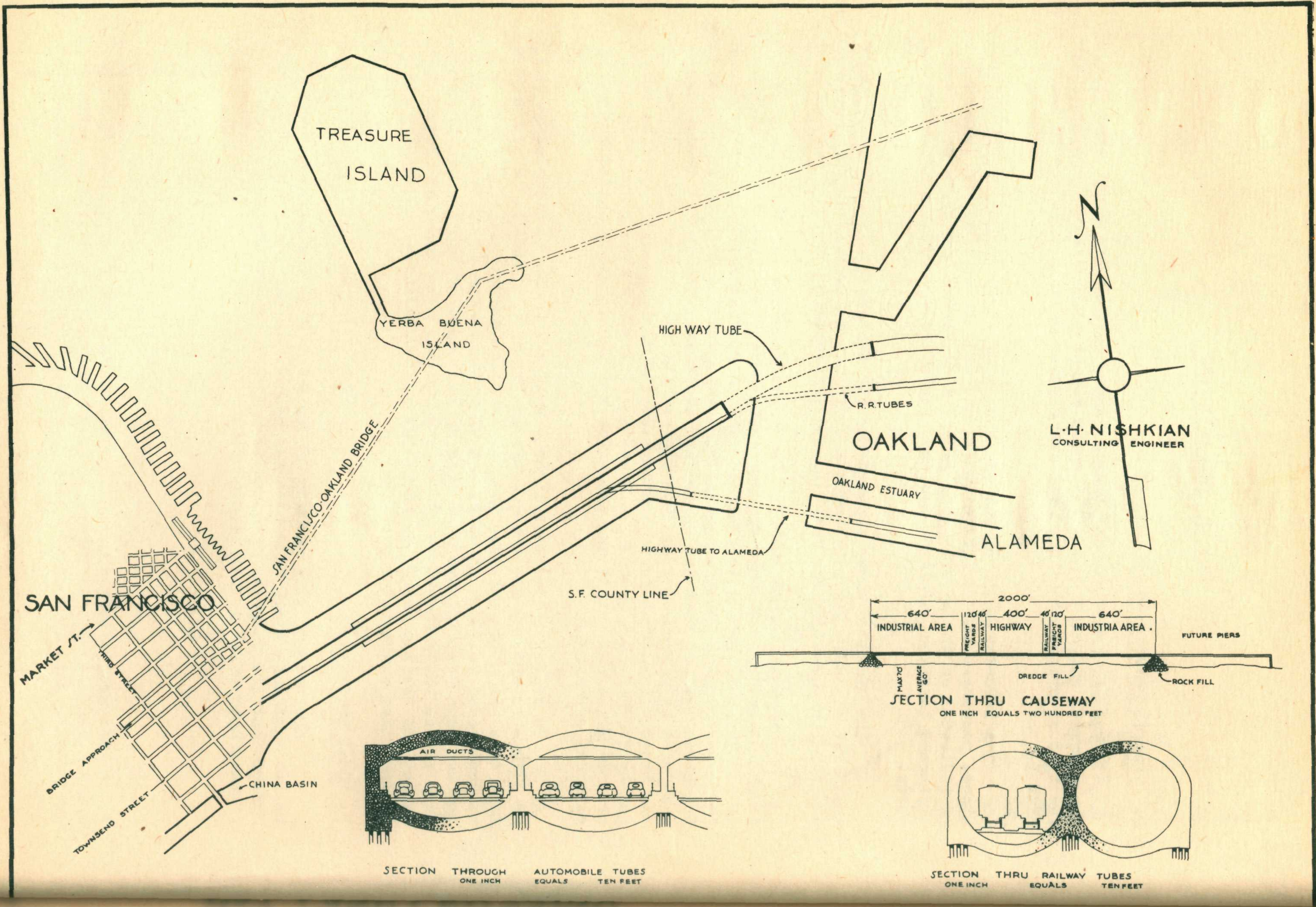
SAN FRANCISCO BAY PROJECT—THE REBER PLAN

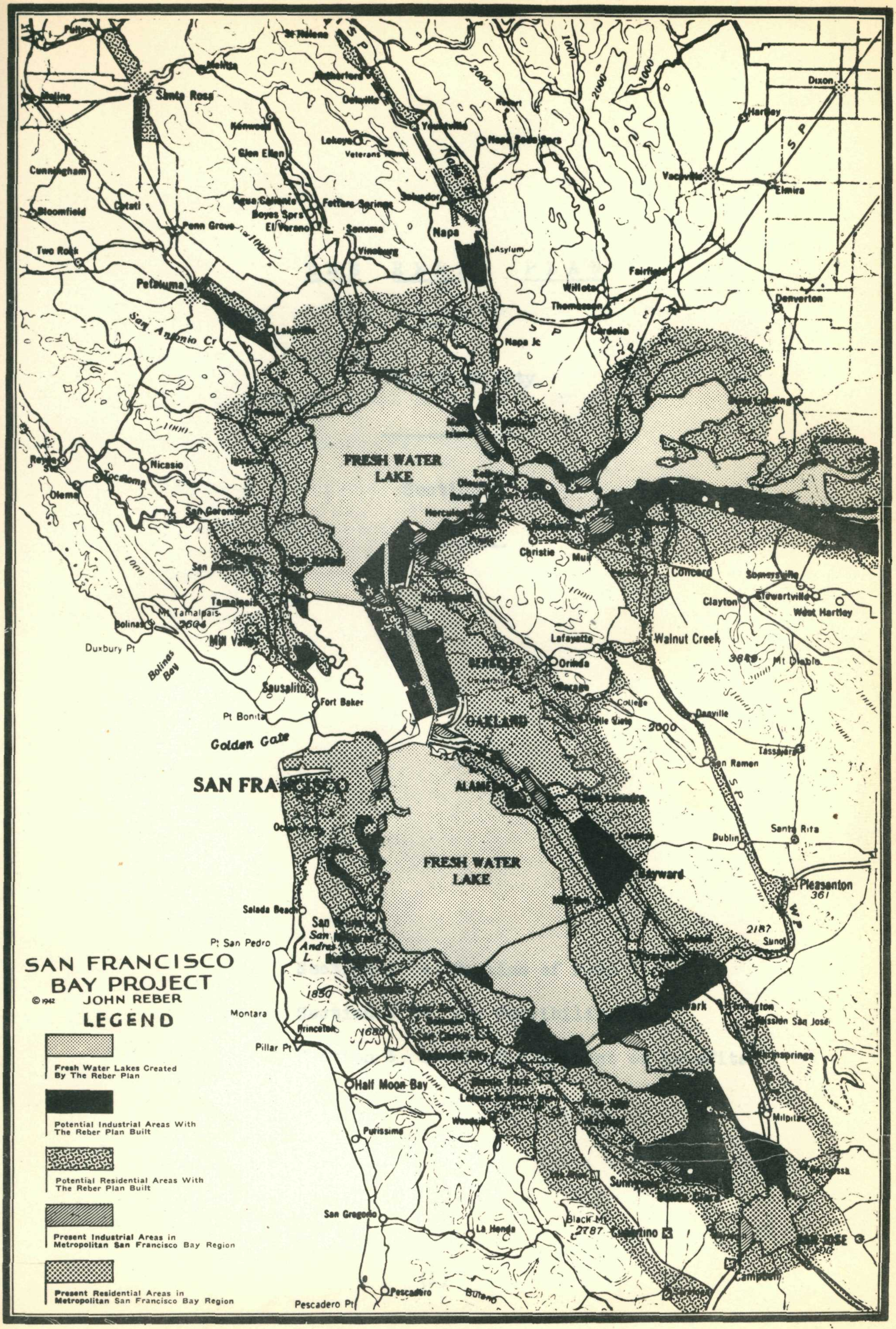


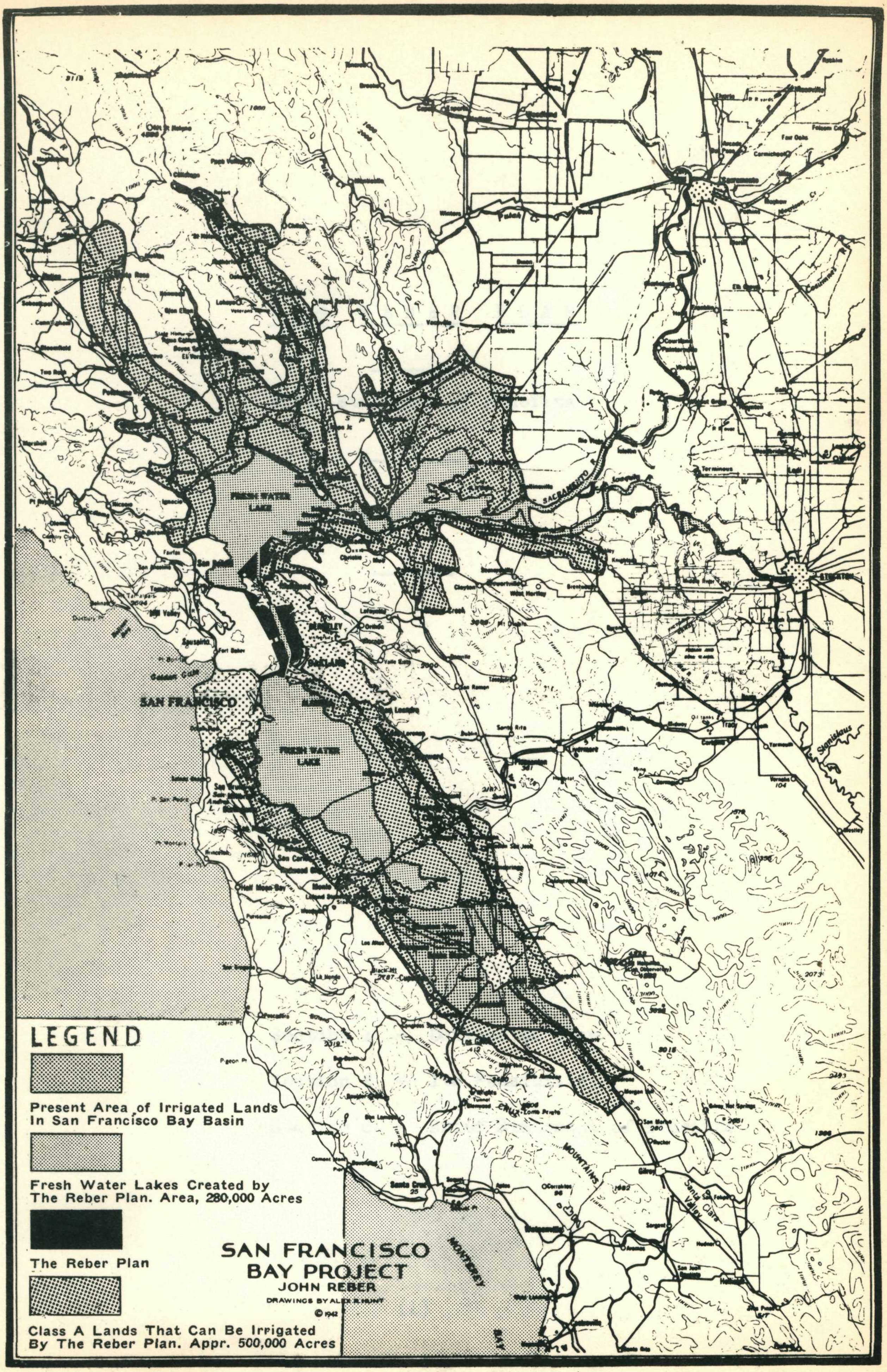
SAN FRANCISCO BAY PROJECT — THE REBER PLA

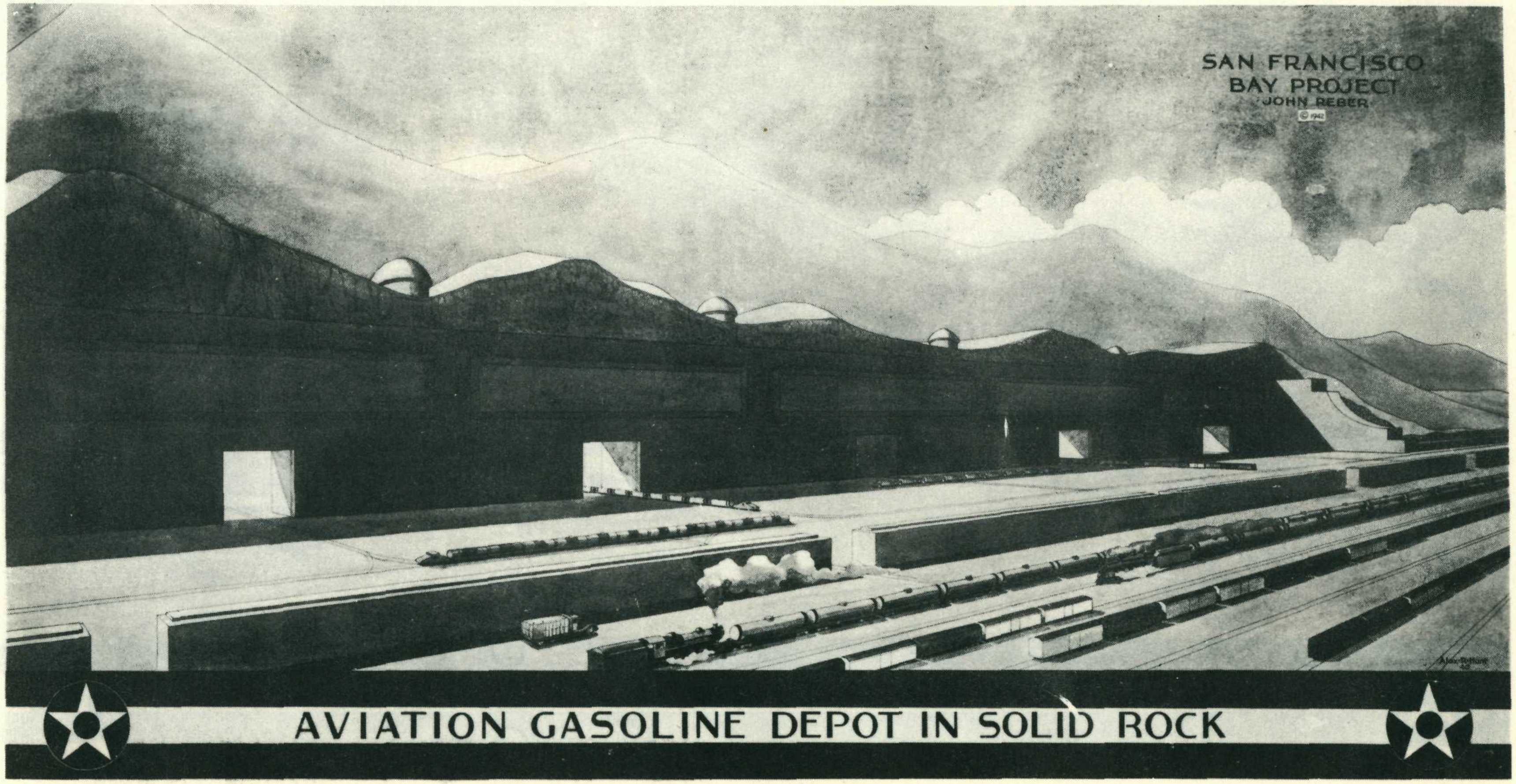


Proposed
BAY LAND CROSSING
for
HIGHWAY & RAILWAY TRAFFIC
L.H. Nishkian CONSULTING ENGINEER

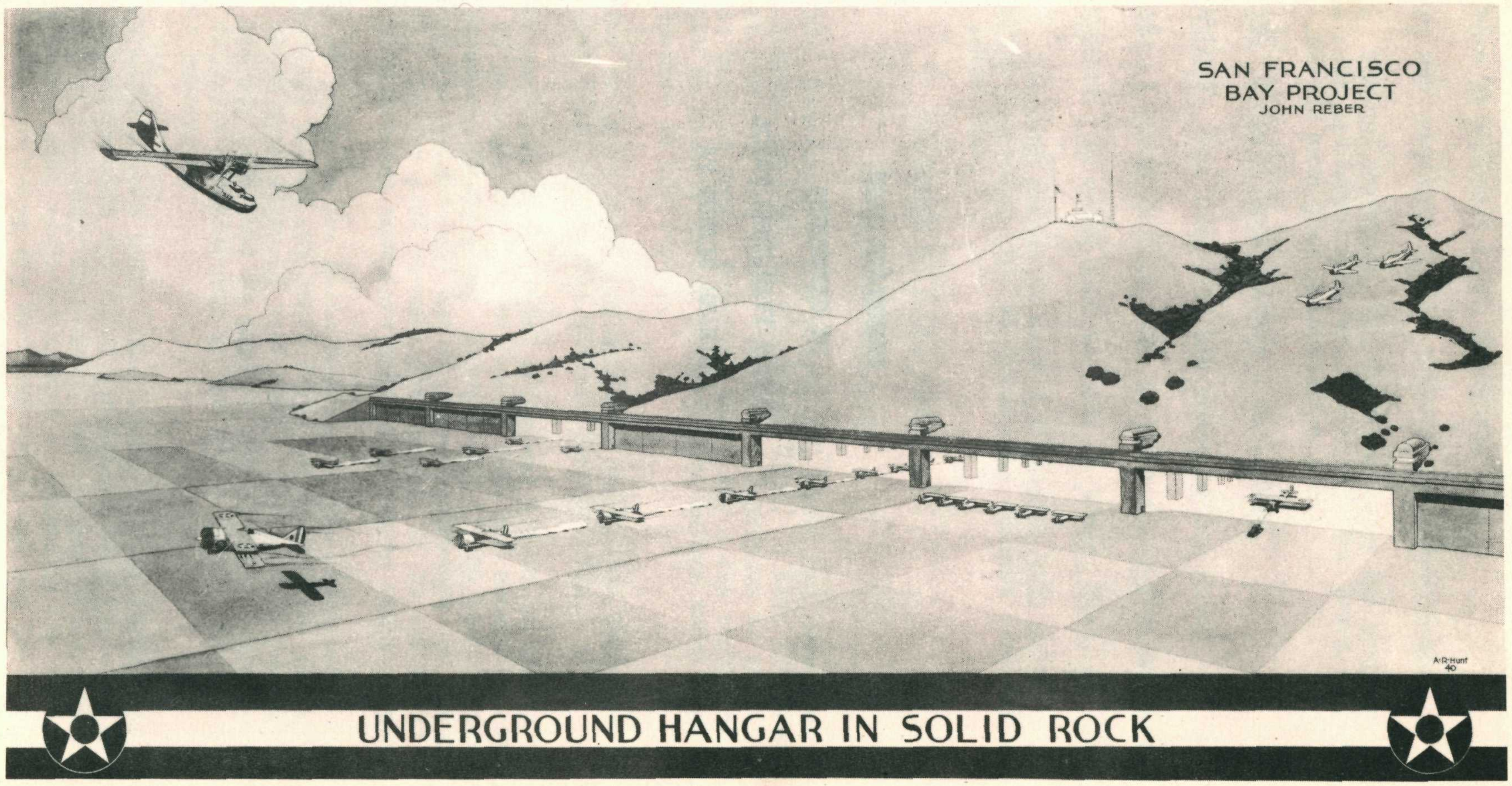

TREASURE ISLAND
YERBA BUENA ISLAND
SAN FRANCISCO-OAKLAND BRIDGE
HIGH WAY TUBE
R.R. TUBES
OAKLAND
OAKLAND ESTUARY
ALAMEDA
HIGHWAY TUBE TO ALAMEDA
S.F. COUNTY LINE
N
L·H· NISHKIAN
CONSULTING ENGINEER
SAN FRANCISCO
MARKET ST.
THIRD STREET
BRIDGE APPROACH
TOWNSEND STREET
CHINA BASIN
2000'
640'
INDUSTRIAL AREA
120'
FREIGHT YARDS
40'
RAILWAY
400'
HIGHWAY
40'
RAILWAY
120'
FREIGHT YARDS
640'
INDUSTRIA AREA
FUTURE PIERS
MAX 70'
AVERAGE 60'
DREDGE FILL
ROCK FILL
SECTION THRU CAUSEWAY
ONE INCH EQUALS TWO HUNDRED FEET
AIR DUCTS
SECTION THROUGH AUTOMOBILE TUBES
ONE INCH EQUALS TEN FEET
SECTION THRU RAILWAY TUBES
ONE INCH EQUALS TEN FEET


SAN FRANCISCO
BAY PROJECT
© 1942 JOHN REBER
LEGEND
Fresh Water Lakes Created By The Reber Plan
Potential Industrial Areas With The Reber Plan Built
Potential Residential Areas With The Reber Plan Built
Present Industrial Areas in Metropolitan San Francisco Bay Region
Present Residential Areas in Metropolitan San Francisco Bay Region
Fulton
St Helena
S P
Rutherford
Oakville
Mark West
Santa Rosa
Kenwood
Lokoya
Veterans Home
Glen Ellen
Yountville
Napa Soda Sprs
Dixon
Hartley
Cunningham
Bloomfield
Cotati
Agua Caliente
Boyes Sprs
El Verano
Fetters Springs
Sonoma
Salvador
Napa
Vacaville
Elmira
Penn Grove
Two Rock
Vineburg
Asylum
Fairfield
Petaluma
Willota
Thomasson
Cordelia
Denverton
San Antonio Cr
Lakeville
Napa Jc
1000
2000
FRESH WATER LAKE
Nicasio
Tocaloma
Olema
San Geronimo
Hercules
Christie
Muir
Concord
Somersville
Clayton
Stewartville
West Hartley
Tamalpais
Mt Tamalpais 2604
Bolinas
Duxbury Pt
Bolinas Bay
Mill Valley
Sausalito
Fort Baker
Pt Bonita
Golden Gate
BERKELEY
Orinda
Lafayette
Walnut Creek
3849 Mt Diablo
OAKLAND
Danville
2000
San Ramon
Tassajara
SAN FRANCISCO
ALAMEDA
FRESH WATER LAKE
Dublin
Santa Rita
Hayward
Pleasanton
361
WP
2187
Sunol
Salada Beach
Pt San Pedro
San Andres L
1850
Montara
Princeton
1680
Pillar Pt
Half Moon Bay
Irvington
Mission San Jose
Warmsprings
Milpitas
Purissima
Woodside
Sunnyvale
Santa Clara
Black Mt 2787
Cupertino
San Gregorio
La Honda
SAN JOSE
Campbell
Pescadero
Butano
Pescadero Pt


LEGEND
Present Area of Irrigated Lands In San Francisco Bay Basin
Fresh Water Lakes Created by The Reber Plan. Area, 280,000 Acres
The Reber Plan
Class A Lands That Can Be Irrigated By The Reber Plan. Appr. 500,000 Acres
SAN FRANCISCO BAY PROJECT
JOHN REBER
DRAWINGS BY ALEX B. HUNT
© 1942
SAN FRANCISCO
FRESH WATER LAKE
FRESH WATER LAKE
OAKLAND
BERKELEY
SACRAMENTO
STOCKTON
Terminous
Lodi
Tracy
Livermore
Stanislaus
Sausalito
Fort Baker
Golden Gate
Mill Valley
Fairfax
San Rafael
Half Moon Bay
Pescadero
Santa Cruz
Gilroy
Santa Clara Valley
MOUNTAINS
MONTEREY BAY
Folsom
Cormichael
Fair Oaks
Clayton
Pigeon Pt
San Pedro
Pt Reyes



THESE UNDERGROUND DEPOTS IN SOLID ROCK BECOME PRACTICABLE IN THE REBER PLAN, BUT ARE NOT INCLUDED IN THE COST ESTIMATE. (SEE PART I, PAGE 6).



UNDERGROUND HANGARS IN SOLID ROCK BECOME PRACTICABLE IN BUILDING THE REBER PLAN, BUT ARE NOT INCLUDED IN THE COST ESTIMATE. (SEE PART I, PAGE 6.)

'Low-Level Bridge Only Real Solution'

BY RICHARD M. MACFARLANE

Trans-Bay crossing problems will never be solved by a new high level bridge.

As soon as one bridge is completed, we must begin planning for a new one.

The only permanent solution to the problem is a solid, low-level causeway across the Bay with space for all future transportation, plus industrial and waterfront expansion.

These are the arguments set forth today by L. H. Nishkian, San Francisco consulting engineer and author of the Nishkian Plan, as he enlarged upon his proposals for a causeway immediately south of the Bay Bridge from San Francisco to Oakland.

2000-FEET WIDE FILL

Mr. Nishkian's projected crossing, presented last week to a joint Army-Navy board which will determine location and type of the proposed second Bay crossing, would include:

1.—An earth and rock fill 2000 feet wide and three miles long, whose western terminus would be between the Bay Bridge and the Channel, and its East Bay terminus near the Oakland Estuary, Oakland Naval Supply Depot and Southern Pacific mole.

2.—On its surface would run at least 24 traffic lanes and four main line railroad tracks, with room for more.

3.—A ship channel 2000 feet wide through the eastern end of the causeway would connect the south Bay with the Bay proper. Vehicular and rail traffic would move under the channel through tubes, with a spur tube running directly to Alameda.

100,000,000 COST

4.—On each side of the transportation lanes would be a strip 600 feet wide for industrial developments and waterfront activities, plus a 160-foot strip for freight yards.

5.—Both sides of the causeway would be used for docks, giving San Francisco an additional six miles of centralized waterfront.

6.—Estimated cost of the project, without industrial or rail development, is 100 million dollars—less than building a twin of the Bay Bridge.

Numerous problems would face engineers building such a structure, Mr. Nishkian admits, such as its effect on tidal flow, work necessary to prepare a foundation on the Bay floor and silting of ship channels caused by the solid fill.

EXTENSIVE STUDY NEEDED

He is careful to point out that extensive engineering studies and model tests must be made to work out these problems. But he is sure the idea itself is sound.

Mr. Nishkian is oposed to locating the causeway south of its proposed location, declaring:

"The majority of your Bay Bridge traffic is bound for the centralized downtown areas of San Francisco and Oakland. Moving the crossing south will not change this flow, and only add several miles to the distance traveled. Whatever the type of crossing, it must serve these two areas directly.

"Terminals for the trans-Bay railroad traffic must be located near the center of the city. It would be foolish to put them any farther away than necessary. With the causeway in its proposed location, rail traffic would feed right into the downtown district.

"It would be necessary to segregate traffic from the causeway and the Bay Bridge as much as possible, but the fact remains that the traffic would be destined for the downtown area and the crossing must serve that traffic."

Mr. Nishkian conceded southward growth of the Peninsula and Alameda County might eventually demand a low level bridge south of Hunters Point, but maintained the causeway must be built in his proposed location to serve the principal traffic needs.

After the State Board of Harbor Commissioners objected that a solid causeway would cut off tidal flow which keeps the San Francisco docks from silting, Mr. Nishkian said his plan could be revised to include an opening along the San Francisco end of the causeway to allow free tidal flow. This opening, however, would not constitute a ship channel and there would be no provision for a draw or lift bridge over it. Transportation would bridge it over a solid, level span.

'AN IDEA OF CHAOS'

The engineer is opposed to any movable bridge structure on the causeway because it would stop the free flow of traffic.

"Imagine what would happen if all traffic were stopped on the Bay Bridge for even 10 minutes, and project that for 36 lanes and four tracks," he said, "and you will get an idea of the chaos it would cause. Since ships move continually to the south Bay, traffic would be interrupted constantly."

Mr. Nishkian maintained the ship channels should be located on the eastern end of the causeway because foundations are better there for tubes. The few miles which would be added to a ship's voyage by going around the causeway would be inconsequential, he said.

GATE SILTING ISSUE

To criticisms that a causeway would cut down the tidal flow which keeps the Golden Gate bar from silting, he replied his calculations indicate the bar would move farther inshore, but not appreciably heighten. Since the bar must be dredged anyway, he said, any additional dredging necessary would be compensated by the added advantages of the causeway.

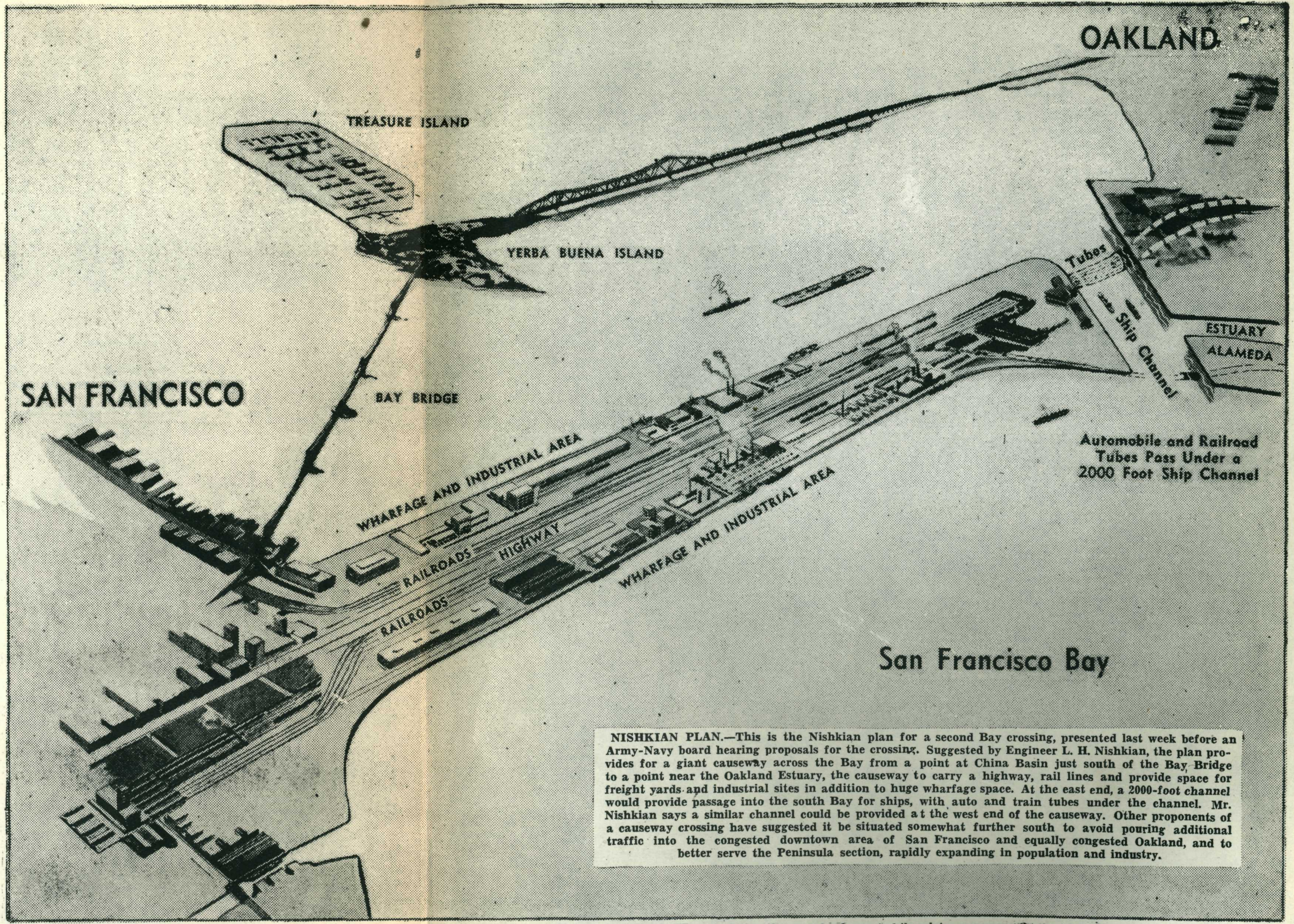
He explained, however, that no one knows the exact effect of the causeway on tidal flow and silting, and it must be studied with models.

Materials for the crossing are readily obtainable in the Bay Area, Mr. Nishkian said. Sand can be dredged from shoal areas, or even from the Golden Gate bar, and rock is easily quarried from a number of places.

He pointed out that while labor and steel costs for a high level bridge have risen considerably, labor costs for dredging are low and the materials cheap.

He calculated the speed of currents through the ship channel at about four miles per hour—which is not excessive—and said its 2000-foot width would give ample room for ships to maneuver. The channel would be more than three times the width of the Oakland Estuary.

The causeway, Mr. Nishkian said, would not interfere with navigation, while solving permanently the trans-Bay crossing problem.



NISHKIAN PLAN.—This is the Nishkian plan for a second Bay crossing, presented last week before an Army-Navy board hearing proposals for the crossing. Suggested by Engineer L. H. Nishkian, the plan provides for a giant causeway across the Bay from a point at China Basin just south of the Bay Bridge to a point near the Oakland Estuary, the causeway to carry a highway, rail lines and provide space for freight yards and industrial sites in addition to huge wharfage space. At the east end, a 2000-foot channel would provide passage into the south Bay for ships, with auto and train tubes under the channel. Mr. Nishkian says a similar channel could be provided at the west end of the causeway. Other proponents of a causeway crossing have suggested it be situated somewhat further south to avoid pouring additional traffic into the congested downtown area of San Francisco and equally congested Oakland, and to better serve the Peninsula section, rapidly expanding in population and industry.